Idaho State Department of Agriculture

Pesticide Management Plan Response Monitoring

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ISDA Technical Results Summary #27

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Introduction

In 2005, the Idaho State Department of Agriculture (ISDA) Ground Water Program was awarded a grant by the Environmental Protection Agency (EPA) to evaluate pesticide concentrations in ground water related to areas of historic elevated detections and areas where spatial monitoring gaps occur. The grant provided resources to conduct initial testing of approximately 56 domestic wells across the state. The testing was undertaken to develop a better understanding of water quality related to pesticides in these areas.

The ISDA has 14 active regional project areas that are sampled for nutrients and common ions every year paid for by ISDA Ground Water Program operating funds. A select number of regional project areas are chosen each year for pesticide analysis, also paid for by ISDA Ground Water Program operating funds. In response to elevated pesticide detections from the 2005 regional project area sampling, four Pesticide Management Plan (PMP) monitoring projects were established. Additional wells surrounding the original elevated pesticide detection were sampled to determine the extent of the pesticide contamination. The projects were designed to gain a better understanding of the pesticide plume in the ground water and the relative contaminant contributions from potential pollutant sources. The information will be used to make regulatory and/or voluntary practice changes on land contributing to the contamination and to implement the Rules Governing Pesticide Management Plans for Ground Water Protection (IDAPA 02.03.01).

In addition to wells located near elevated pesticide detections, seven wells located throughout Payette County were sampled for pesticides to fill in spatial gaps within the Payette and Gem Counties Regional Project area.

In addition to pesticide sampling, water samples at each well location were analyzed for nitrate-nitrogen and other common ions. The primary reason for this analysis was to evaluate nitrate impacts at each location due to known nitrate contamination problems in the state. ISDA Ground Water Program operating funds were used to fund this testing. Results of this testing are beyond the scope of this document and will be presented in a future report.

Background

ISDA is responsible for a variety of programs, laws, and rules for protection of ground water from pesticides. The division of Agricultural Resources has a Cooperative Agreement with EPA to implement the EPA Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). ISDA staff implements Idaho Pesticide Laws and Rules to implement FIFRA. ISDA staff conduct monitoring duties to fulfill this cooperative agreement.

ISDA regulates pesticide use and handling under Title 22 Chapter 34, Pesticides and Chemigation, Idaho Code. ISDA is the lead agency in developing the *Idaho Pesticide Management Plan (PMP) for Ground Water Protection* and the recently passed *Rules Governing Pesticide Management Plans for Ground Water Protection*. The Idaho PMP outlines processes to protect ground water from pesticides and defines pesticide detections based on the concentration of the detection compared to a reference point. The reference point refers to health based concentrations. Idaho has adopted the EPA's MCLs in the Idaho Ground Water Quality Rule (1997). Where no MCL exists, the ISDA will use EPA Health Advisories Levels (HAL) first, and if neither exists an EPA Reference Dose (RfD) number.

The PMP breaks the pesticide detections into the following levels:

Level 1: Detection above the detection limit to less than 20% of Reference Point.
Level 2: Detection at 20% to less than 50% of Reference Point.
Level 3: Detection at 50% to less than 100% of Reference Point.
Level 4: Detection greater than 100% of Reference Point.

Most of the wells sampled for pesticides for the ISDA regional monitoring program had no detections of pesticides. The majority of the positive pesticide detections from the regional monitoring fell within the Level 1 detection range, except for a Level 4 detection of triallate in Fremont County, a Level 4 detection of dacthal (DCPA) in Owyhee County, a Level 2 detection of atrazine and Level 3 detection of desethyl atrazine (DEA) in Nez Perce County, and a Level 2 detection of DEA in Payette County. Figure 1

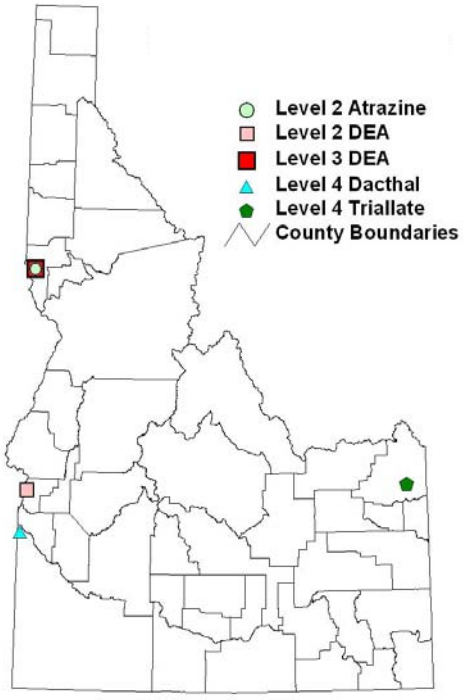

Figure 1. Level 2, 3, and 4 pesticide detections from ISDA 2005 regional project monitoring.

shows the locations of the Level 2, 3, and 4 pesticide detections. These four locations required follow up monitoring to determine the extent and severity of pesticide contamination.

Since the 1990's, the ISDA Ground Water Program has conducted pesticide testing through local and regional scale ground water monitoring in agricultural areas of the state. Regional projects have been established primarily through review of Idaho Department of Water Resources (IDWR) Statewide Program monitoring. Areas having pesticide detections or nitrate detections above the health standard created the impetuous to start these regional projects. Local monitoring has been established through regional monitoring detections, public complaints, and as a result of interagency requests. Although these monitoring activities cover many areas of the state, geographic gaps related to pesticide testing in Idaho still exist providing the impetus for requesting the grant to fund the monitoring activity described in this report. This year spatial gaps in the Payette County area were addressed.

Methods

Well sites for ground water pesticide testing were selected based on a geographic review of existing pesticide data in IDWR and ISDA databases. Four wells sampled in ISDA regional monitoring projects had pesticide detections greater than 20% of a reference point (Figure 1). Wells located within close proximity of the elevated pesticide detection and screened within the same aquifer system were chosen for sampling.

Within the Payette County area, existing ground water quality data were overlain on landuse data using ArcView® and visually evaluated. Agricultural areas showing no ground water pesticide testing or having large spatial gaps between data were selected for testing. Permission was gained from the land owners prior to sampling.

All sample collection followed established ISDA ground water monitoring standard operating procedures (on file at the ISDA main office) for sampling, handling, storage, and shipping of pesticide water samples. Analysis of samples were completed by the University of Idaho Analytical Sciences Laboratory (UIASL) strictly following federal Good Laboratory Practices. UIASL used liquid chromatography/mass spectrometry analysis for pesticides utilizing EPA Methods 507, 508, 515.2, and 632. Testing included pesticide analysis for 120 different herbicide and pesticide compounds known to be used in Idaho. Duplicates, blanks, splits, and matrix spikes/matrix spike duplicates were collected and submitted following ISDA Ground Water Program protocols.

Results

Owyhee County Dacthal

Figure 2 shows the pesticide results from the follow-up sampling for the Level 4 dacthal detection in Owyhee County (Project 310). The project area is located ap-

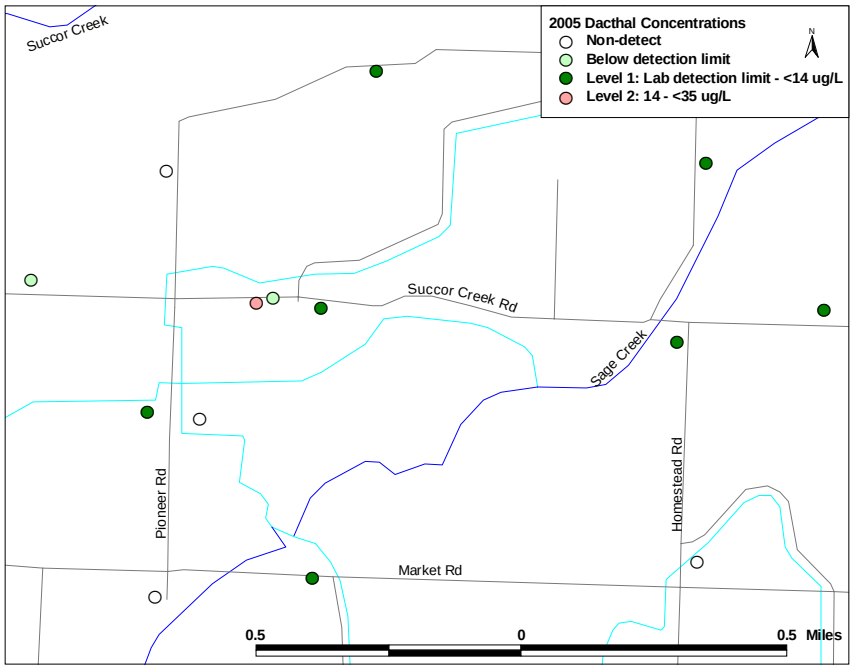

Figure 2. Pesticide results from ISDA 2005 sampling of Project 310: Owyhee County Dacthal Response PMP Monitoring Project.

proximately 3 miles south of Homedale. A total of 14 wells were sampled in August 2005 for pesticides and nutrients. The well with the original Level 4 detection dropped to a Level 2 detection in the follow-up sampling in August. Four wells had no detection of dacthal, and two wells had dacthal concentrations below the lab detection limit. The remaining seven wells had Level 1 concentrations of dacthal, ranging from 0.10 to 13 µg/L.

Table 1 presents summary statistics for the 14 wells sampled for the Owyhee County Dacthal follow-up monitoring. In addition to dacthal (DCPA), three other pesticides were detected in the ground water. Atrazine, desethyl atrazine, and simazine were found in one well each. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP, except for the Level 2 dacthal detection.

Fremont County Triallate

Figure 3 presents the pesticide results from the follow-up sampling for the Level 4 triallate detection in Fremont County (Project 320). The original sample from the well was taken in June, 2005. The project area is located approximately 5.5 miles northeast of Ashton. A total of 15 wells in the project area were sampled in 2005 for pesticides and nutrients. The well with the original Level 4 detection in June dropped to a concentration below the detection limit in the follow up sampling in October. An additional well had a concentration of triallate below the detection limit, and the remaining 13 wells had no detections of triallate. One well had Level 1 detections of

Table 1. Summary of pesticide detections from Project 310.

Pesticide	Detections above LDL[1]	Range (µg/L)	Mean (µg/L)	Median (µg/L)	Reference Point (µg/L)
Atrazine	1	0.05	-----	-----	3 (MCL)[2]
Dacthal (DCPA)	8	0.098 - 28	6.07	0.48	70 (HAL)[3]
Desethyl Atrazine[4]	1	0.07	-----	-----	-----
Simazine	1	0.02	-----	-----	4 (MCL)

[1]LDL – Laboratory Detection Limit
[2]MCL – EPA Maximum Contaminant Level
[3]HAL – EPA Health Advisory Level
[4]Breakdown product of Atrazine

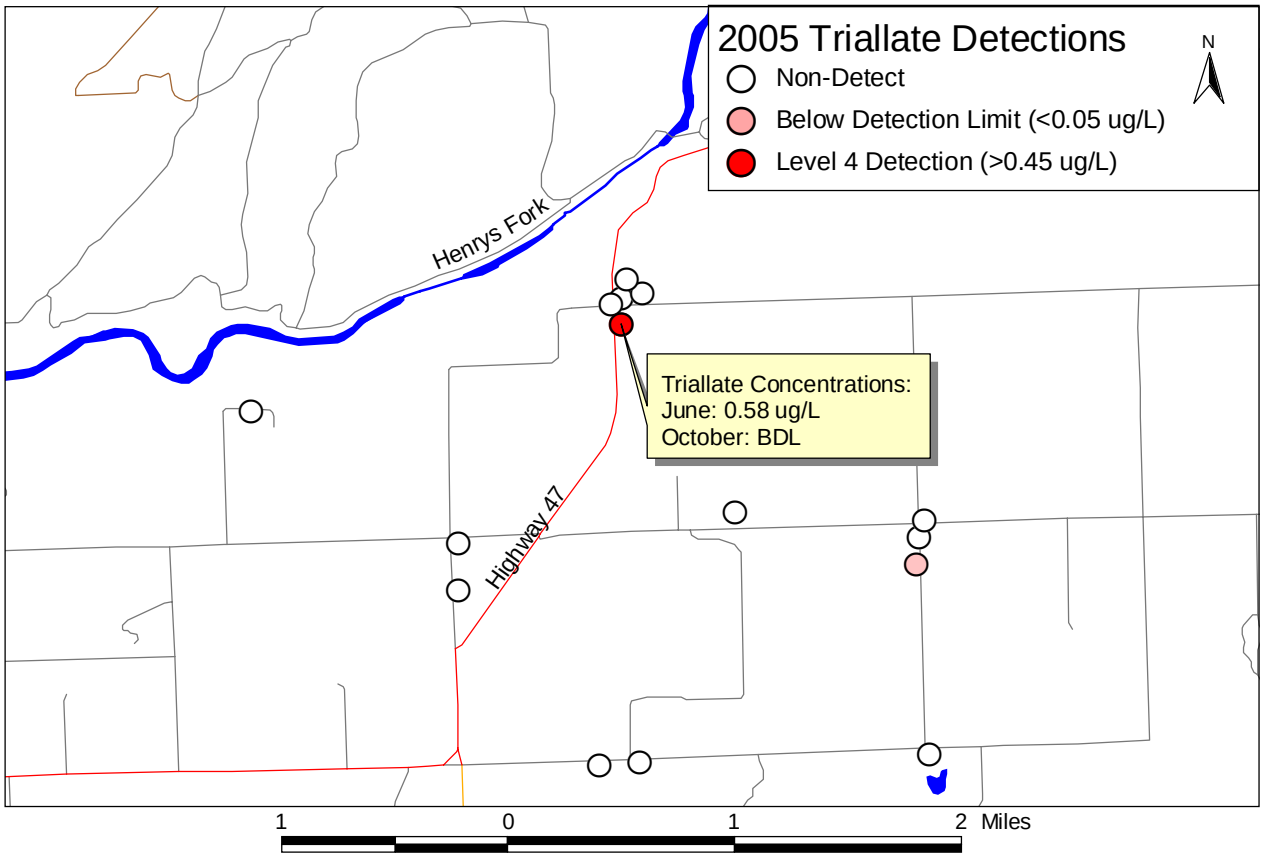

Figure 3. Pesticide results from ISDA 2005 sampling of Project 320: Fremont County Triallate Response PMP Monitoring Project.

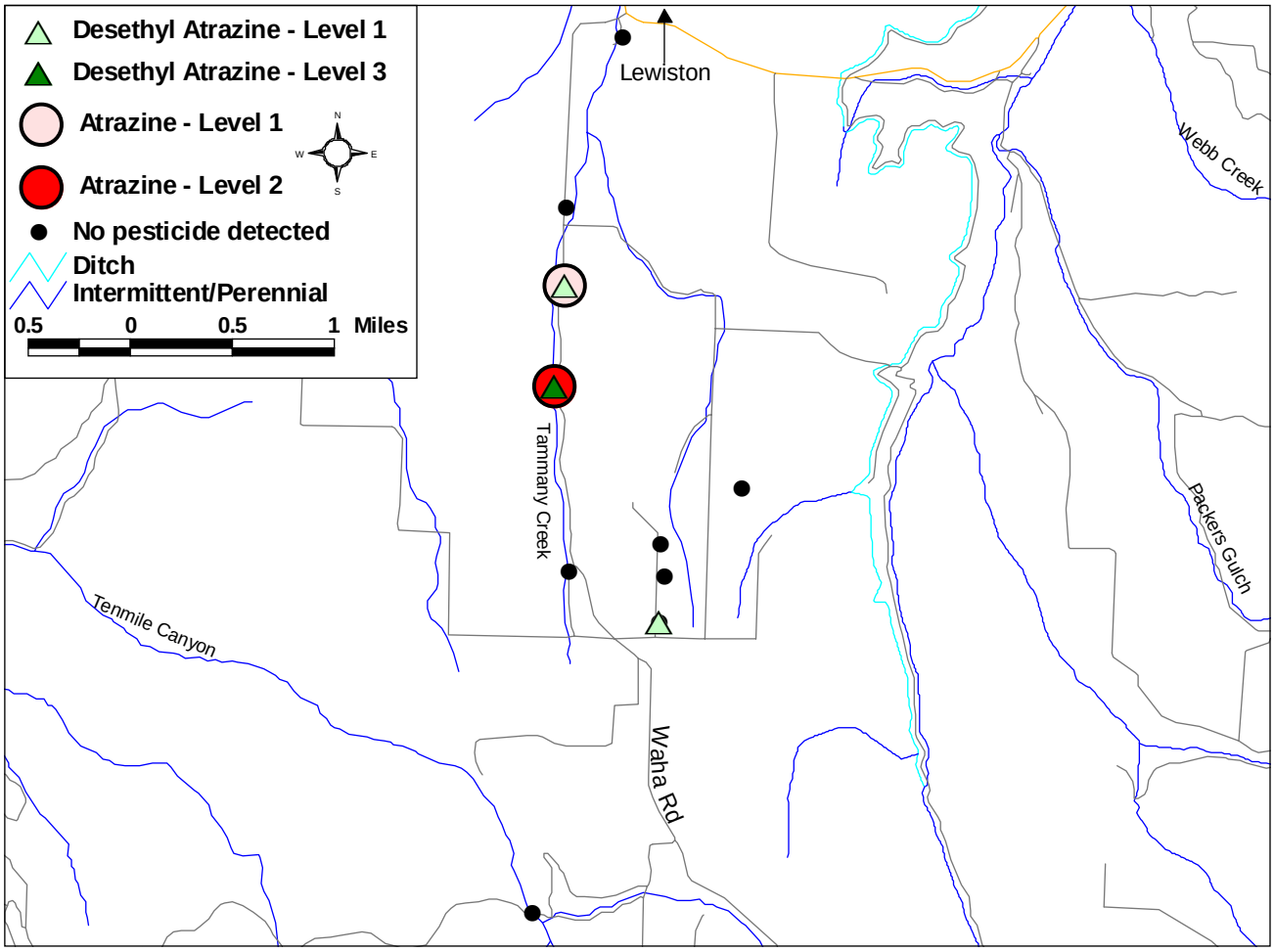

Figure 4. Pesticide results from ISDA 2005 sampling of Project 330: Nez Perce County Atrazine Response PMP Monitoring Project.

atrazine and desethyl atrazine. All pesticide detections in the October follow up sampling were below any health standards set by EPA or the state of Idaho. Except for the initial Level 4 detection of triallate in June, all pesticide detections were either below or within the Level 1 category.

Nez Perce County Atrazine and Desethyl Atrazine

Figure 4 presents the pesticide results from the October 2005 follow-up sampling for the Level 2 atrazine and Level 3 desethyl atrazine (DEA) detections in Nez Perce County (Project 330). The project area is located approximately six miles south of Lewiston. A total of 10 wells were sampled in 2005 for pesticides and nutrients. The well that initiated the investigation had a Level 2 atrazine detection and a Level 3 DEA detection in the follow-up testing, consistent with the initial testing. One well had a Level 1 detection of atrazine and two wells had Level 1 detections of DEA. The remaining seven wells had no detections of atrazine or DEA above the lab detection limit. All pesticide detections in the follow-up sampling were below any health standards set by EPA or the state of Idaho.

Table 2 presents summary statistics for the 10 wells sampled for the Nez Perce County Atrazine and DEA follow up monitoring. In addition to atrazine and DEA, three

Table 2. Summary of pesticide detections from Project 330.

Pesticide	Detections above LDL[1]	Range (µg/L)	Mean (µg/L)	Median (µg/L)	Reference Point (µg/L)
Atrazine	2	0.06 - 1.3	0.64	0.066	3 (MCL)[2]
Bromacil	1	0.51	-----	-----	90 (HAL)[3]
Desethyl Atrazine[4]	3	0.06 - 1.8	0.68	0.68	-----
Diuron	1	0.2	-----	-----	10 (HAL)
Picloram	1	0.48	-----	-----	500 (MCL)

[1]LDL – Laboratory Detection Limit
[2]MCL – EPA Maximum Contaminant Level
[3]HAL – EPA Health Advisory Level
[4]Breakdown product of Atrazine

other pesticides were detected in the ground water. Bromacil, diuron, and picloram were found in one well each. All detections were below any health standards set by the EPA or the state of Idaho.

Payette County Desethyl Atrazine

Figure 5 presents the atrazine and desethyl atrazine (DEA) results from the follow up sampling in November 2005 for the Level 2 DEA detections in Payette County (Project 340). The project area is located on the eastern side of Fruitland. A total of 10 wells near the initial DEA detection were sampled in 2005 for pesticides and nutrients. One well had a Level 3 DEA detection, two wells had Level 2 DEA detections, and four wells had DEA detections below the lab detection limit. Two wells had Level 2 atrazine detections, three wells had Level 1 atrazine detections, and 2 wells had atrazine detections below the lab detection limit. The remaining three wells had no detections of atrazine or DEA. All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.

In addition to the ten wells sampled around the original Level 2 DEA detection, seven wells located throughout Payette County were sampled for pesticides to fill in spatial gaps in the regional project area in Payette County. Out of the 17 wells sampled in Payette County in November, six wells had atrazine detections above the lab detection limit (LDL), four wells had DEA detections above the LDL, three wells had dacthal (DCPA) detections above the LDL, and two wells had deisopropyl atrazine

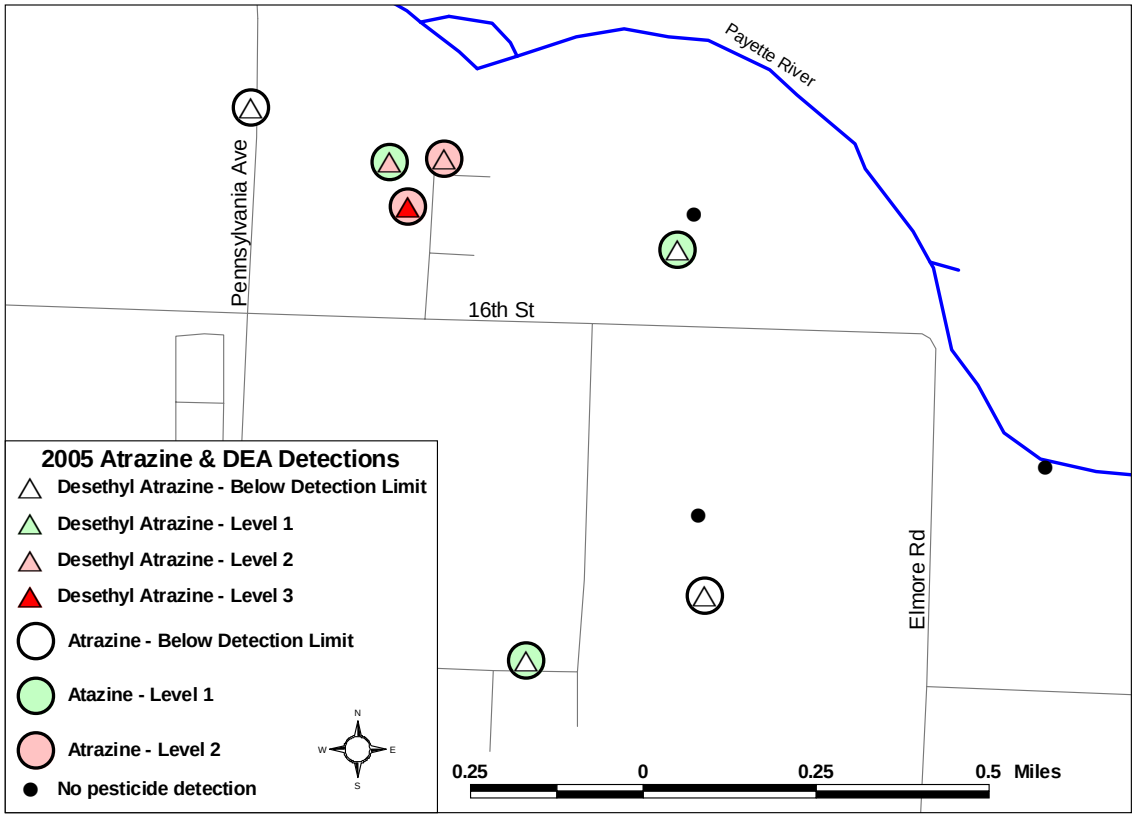

Figure 5. Pesticide results from ISDA 2005 sampling of Project 340: Payette County Desethyl Atrazine Response PMP Monitoring Project.

Table 3. Summary of pesticide detections from Project 340.

Pesticide	Detections above LDL[1]	Range (µg/L)	Mean (µg/L)	Median (µg/L)	Reference Point (µg/L)
Atrazine	6	0.025 - 1.1	0.42	0.20	3 (MCL)[2]
Bentazon	1	0.52	-----	-----	200 (HAL)[3]
Bromacil	1	0.14	-----	-----	90 (HAL)
Dacthal (DCPA)	3	0.095 - 0.65	0.34	0.26	70 (HAL)
Desethyl Atrazine[4]	4	0.04 - 1.6	0.89	0.97	-----
Deisopropyl Atrazine[4]	2	0.034 - 0.048	0.041	0.041	-----

[1]LDL – Laboratory Detection Limit
[2]MCL – EPA Maximum Contaminant Level
[3]HAL – EPA Health Advisory Level
[4]Breakdown product of Atrazine

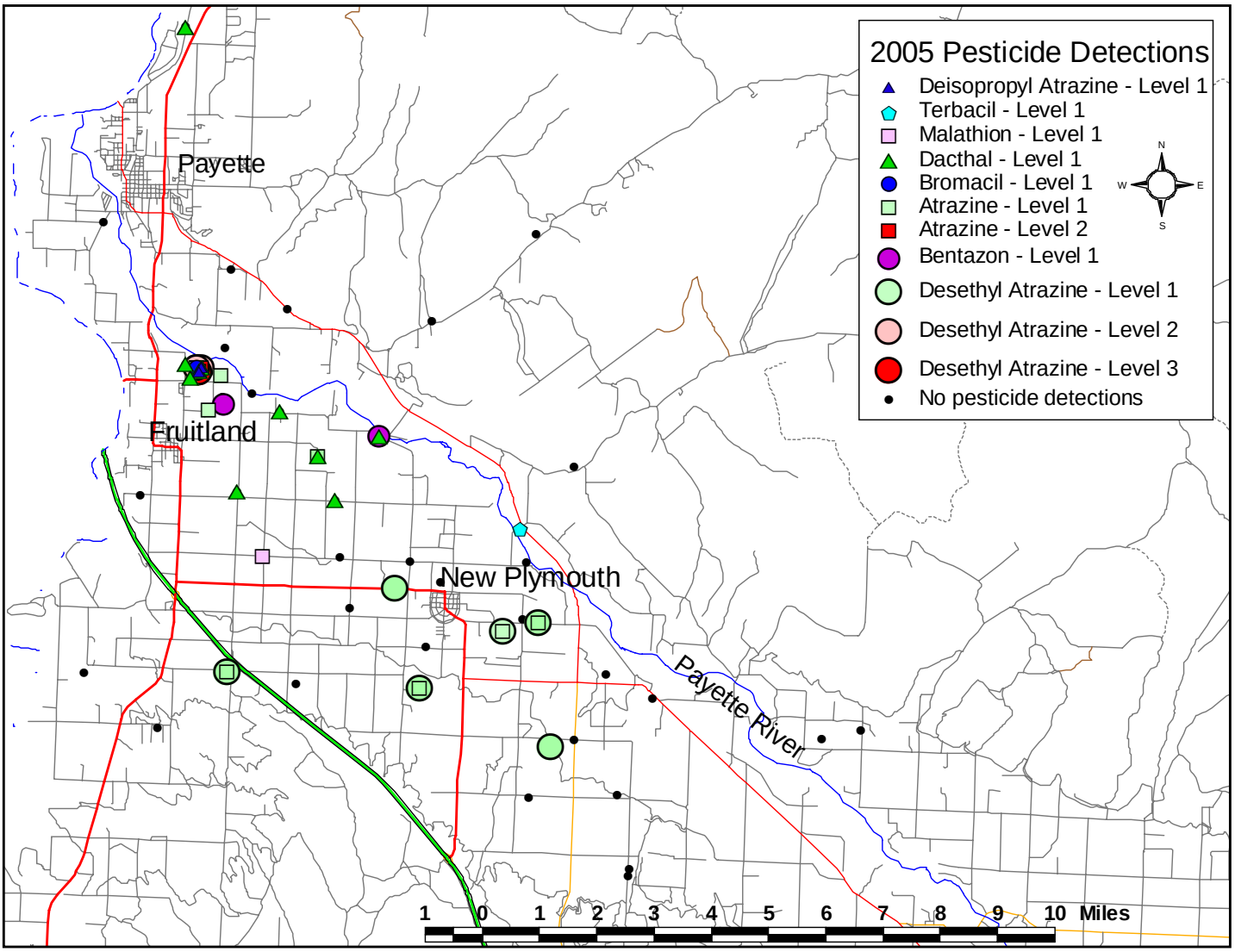

Figure 6. Pesticide results from ISDA 2005 sampling of Project 340: Payette County Atrazine and Desethyl Atrazine Response PMP Monitoring Project and Project 770: Gem and Payette County Regional Project.

(DIA) detections above the LDL. The pesticides bentazon and bromacil were each detected in one well above the LDL. Table 3 presents the summary information for the pesticide detections.

Figure 6 presents the pesticide detections from the Regional Project 770 and the follow-up project 340. Project 340 was designed to monitor ground water near the Level 2 DEA detection near Fruitland as well as fill in some spatial gaps of Regional Project 770.

Education

Another focus of this project was to conduct education efforts at workshops and conferences (Table 4) to inform pesticide applicators and local homeowners of the pesticide monitoring results. These events were mostly pesticide recertification workshops, conferences, or special schools that ISDA staff organized or participated in. At some locations, University of Idaho Extension, Soil and Water Conservation Districts, and agricultural industry representatives were involved with planning and implementation of the workshops. Workshops held in areas near the four areas with Level 2 or greater pesticide detections (Marsing, Lewiston, Moscow, Greencreek, Ashton, St. Anthony, and Ontario) had a focus on results from the PMP follow-up monitoring and ISDA responses to the detections. Other training topics included: pesticide and water quality issues, water quality monitoring results, Idaho PMP rules, Idaho Home & Farm*A*Syst Program,

Table 4. Summary of workshops for 2005/2006 winter.

Date	Location	Event Name	Attendance
12/15/2005	Marsing	Owyhee County Farmer's Appreciation Day	27
1/10/2006	Jackpot, NV	Far West Winter Conference	109
1/20/2006	Boise	Idaho Horticulture Expo	48
1/31/2006	Caldwell	Western Idaho Agriculture Show	48
2/2/2006	Nampa	Idaho Weed Conference	25
2/7/2006	Lewiston	Extension Cereal School	24
2/8/2006	Moscow	Latah County Cereal School	39
2/9/2006	Greencreek	Prairie Area Cereal School	96
2/17/2006	Ontario, OR	Chemical Fruit Fair	53
2/23/2006	Weiser	Applicator Seminar	32
3/3/2006	Lewiston	Pesticide Applicator Recertification Workshop	30
3/20/2006	St. Anthony	Water Quality Pesticide Recertification Workshop	21
3/21/2006	Ashton	Water Quality Pesticide Recertification Workshop	29
3/22/2006	Fort Hall	Water Quality Pesticide Recertification Workshop	7
3/22/2006	Blackfoot	Water Quality Pesticide Recertification Workshop	16
3/29/2006	Bonners Ferry	Pesticide Applicator Recertification Workshop	27
3/29/2006	Sandpoint	Pesticide Applicator Recertification Workshop	31

understanding pesticide labels, regional or local specific issues and reports, integrated pest management, weed management, and ISDA container recycling and pesticide disposal programs. A total of 662 people were trained at these events (Table 4).

Conclusions

Results of testing indicate that the four areas of the state with elevated pesticides in ground water are of concern and may require ISDA to respond to the detections. The data gathered from this project led to a better understanding of the pesticide contamination in the ground water at each location. This information will be used to make regulatory and/or voluntary practice changes in the project areas and to implement the PMP rule. In addition, spatial gaps within the Payette and Gem County Regional Project were tested and found to have pesticides within the ground water. This project proved useful in locating areas with pesticides in ground water and helping to determine appropriate responses to the detections.

Recommendations

ISDA personnel will continue to stress the importance to pesticide applicators to adhere to label requirements and to apply all pesticides according to federal and state laws. ISDA will continue to educate applicators in these efforts. ISDA has formed a PMP Advisory committee to help develop pesticide management practices options, determine management practices effectiveness and make recommendations for changing and improving pesticide management practices.

ISDA Water Program staff recommend similar projects in the future to help identify areas of concern and assist with the PMP Rule implementation process. Areas with little historical testing for pesticides still exist within the state of Idaho.

Acknowledgements

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Technical review of this document from the following individuals is greatly appreciated:

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